

A. Title: Application for a Permit for Scientific Purposes under Section 10 of the Endangered Species Act.

B. Species (Evolutionarily Significant Units)

Upper Columbia River (UCR) Chinook Salmon (endangered)
Upper Columbia River (UCR) Steelhead (endangered)
Middle Columbia River (MCR) Steelhead (threatened)
Upper Willamette River (UWR) Chinook Salmon (threatened)
Upper Willamette River (UWR) Steelhead (threatened)
Oregon Coast (OC) Coho Salmon (uncertain)

C. Application Date: 16 December, 2005

D. Applicant Identity:

Robert M. Hughes
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Names to be added to existing applicant (Robert M. Hughes):

TBN Fish Taxonomist & Crew Chief

E. Information on Personnel, Cooperators, and Sponsors

1. Principal Investigator: Robert M. Hughes

Robert M. Hughes received his Ph.D. in Fisheries from Oregon State University in 1979. He has sampled fish in streams (California, Colorado, Idaho, Michigan, Montana, Nevada, Oregon, Washington) and rivers (Arizona, Ohio, Oregon, Pennsylvania, France) with backpack, bank, and boat electrofishers. He discovered and published on a transplanted population of killifish in the Yampa River (Colorado) drainage. Dr. Hughes took the electrofishing course from the U.S. Fish & Wildlife Service Fisheries Academy in 1991 and a second course sponsored by the USEPA in 1997. He is a chapter author in New Perspectives in Electrofishing, EPA/600/R-99/108, and coauthor of an electrofishing chapter in three USEPA biomonitoring protocols (Plafkin et al. 1989, McCormick & Hughes 1998, Hughes & McCormick 1998). Hughes has authored or coauthored 60 peer reviewed publications dealing with fish assemblage monitoring and assessment and has given invited seminars on those topics in France, Poland, Brazil, Bolivia, and Austria.

Field Supervisor: Robert M. Hughes

2. Field personnel : These individuals will be hired in the spring of 2005

3. Funding source: U.S. Environmental Protection Agency

SPONSORS & COOPERATING INSTITUTIONS:

Rick Haefle, ODEQ, 1712 SW 11th, Portland, OR, 97201, 503 229 5983.
Mike Mulvey, ODEQ, 1712 SW 11th, Portland, OR, 97201, 503 229 5983.
Doug Drake, ODEQ, 1712 SW 11th, Portland, OR, 97201, 503 229 5983.
Mario Solazzi, ODFW, 28655 Hwy. 34, Corvallis, OR, 97333, 541 757 4263
Michael McIntyre, IDEQ, 1410 N. Hilton, Boise, ID, 83706, 208 373 0502
Mary-Anne Nelson, IDEQ, 1410 N. Hilton, Boise, ID, 83706, 208 373 0502
Bob Steed, IDEQ, 2111 Ironwood Parkway, Couer d'Alene, ID, 83816, 208 769 1422
Vaughn Paragamian, IDFG, 2750 Kathleen Ave., Coeur d'Alene, ID, 83815, 208 769 1414
Rob Plotnikoff, WA Ecology, 300 Desmond Dr., Olympia, WA, 98504, 360 407 6687
Glenn Merritt, WA Ecology, 300 Desmond Dr., Olympia, WA, 98504, 360 407 6777
Gretchen Hayslip, USEPA, 1200 Sixth Ave., Seattle, WA, 98101, 206 553 1685
Lil Herger, USEPA, 1200 Sixth Ave., Seattle, WA, 98101, 206 553 1074
Peter Leinenback, USEPA, 1200 Sixth Ave., Seattle, WA, 98101, 206 553 0524
Brian Hill, USEPA, 6201 Congdon Blvd., Duluth, MN, 55804, 218 529 5224
David Peck, USEPA, 200 SW 35th St., Corvallis, OR, 97333, 541 754 4426
John Stoddard, USEPA, 200 SW 35th St., Corvallis, OR, 97333, 541 754 4441
Steve Corbett, USNPS, 600 E. Park Ave., Port Angeles, WA, 98362, 360 565 3086
John Arterburn, Colville Confed. Tribes, 23 Brooks Tracts Rd., Omak, WA, 98841, 509 422 7424

4. Statement of cooperator: Robert M. Hughes will be in contact with and supervise the taking of fish by the Oregon State University field crew.

5. Specimen Disposition: Vouchers of non-listed fish species collected, or the occasional species that are killed, will be deposited in museum(s) and laboratories.

Voucher fish specimens from the 2005 field season will be deposited with:

Dr. Douglas F. Markle
Curator of Fishes
Oregon State University Ichthyological Museum
Department of Fisheries & Wildlife
Oregon State University
Corvallis, OR 97331
541 737 1970

Don Zaroban
Fish Curator
Orma J. Smith Museum of Natural History
Albertson College of Idaho
Caldwell, ID 83605
208 373-0405.

6. Transporting & Holding: There will be no transporting or holding of fish in this project.

F. Project Description, Purpose, and Significance

GENERAL: Our objective is to determine the minimum number of samples to estimate the condition of an entire main stem river in a rigorous manner. To do so we will obtain 25 random samples from two rivers in each of Oregon, Washington, and Idaho. Fish assemblages will be sampled by raft electrofishing. Assemblage data will be converted to index of biotic integrity (IBI) scores and analyzed through use of Monte Carlo analyses to determine the minimum number of sites need to attain $\pm 90\%$ of the final IBI score produced from all 25.

OVERVIEW: The USEPA and the Idaho, Oregon, and Washington water quality agencies are seeking scientifically and statistically rigorous field protocols for assessing large (unwadeable) rivers. They realize that a single sample is inadequate, and that a complete census is impractical. They also realize that hand-picked sites can produce biased estimates of entire rivers and cannot be used for inferring to other river reaches. Our river survey is a continuation of the USEPA's Environmental Monitoring and Assessment Program's (EMAP) sampling efforts in the same states during 2000-2004. Four persons in two rafts will sample fish, macroinvertebrates, and periphyton assemblages as well as physical and chemical habitat conditions in reaches 50 times the mean wetted width of the channel. Normally 2-3 sites can be sampled per day. Since the river sites will all be randomly selected, the data collected can be used for estimating the ecological condition of each river.

BROADER SIGNIFICANCE: These sites are a continuation of a larger project that assessed the condition of rivers and streams in the 12 conterminous western states and found that 44% of the stream/river length was in least-disturbed condition for vertebrates, and 50% for invertebrates (Stoddard et al. 2005). An objective of those surveys was to assess status and trends in a region's or state's surface waters in a statistically and ecologically rigorous manner as mandated by the Clean Water Act. Ecologically and statistically rigorous monitoring should lead to rigorous enforcement of that Act. This in turn will reduce the need for listing those aquatic species that are limited by physical and chemical habitat, and increase the recovery potential of those that are listed.

G. Project Methodology

PROCEDURES: Each river will be sampled once at 25 randomly-selected sites between 19 June and 1 September in 2006 or in 2007. Flows, fires, and work load determine which year each river is sampled. Rivers are fished using a Smith-Root 2.5 GPP electrofisher (pulsed DC current) mounted on the rowing frame of a 14' or 15' raft. Single pass electrofishing is employed and block nets are not used. Stunned fish are recovered in a soft mesh dipnet and placed in a livewell. Rivers are fished by randomly selecting one side of the river to begin electrofishing and rowing downstream a distance equal to 50 times the mean wetted channel width. We alternate sides of the river every other transect, stopping every 10 channel widths to process the fish. We remove each fish from the livewell, record species, the minimum and maximum length, and presence of any anomalies, then return the fish to the water alive. Holding times in the livewell following these procedures have ranged from 6-17 minutes and varied with current velocity and the number of fish netted. Any suspected listed fish are not netted or, if collected, processed first to minimize stress in these animals. We follow the general guidelines for fish field research of Hubbs et al. (1988).

Where allowed, voucher specimens for taxonomic verification are labeled and preserved in 10% formalin.

INJURY POTENTIAL: The potential for injury or mortality to listed species exists with electrofishing. Trauma may include bruising if the fish directly contacts the electrofisher anode droppers, and exhaustion resulting from electrofishing and handling. Occasional incidental mortality may occur as well resulting from a combination of these stresses.

To reduce mortalities at sampling sites, we hire experienced crew members, train them for two weeks, and audit their field work. We do not hold fish in the electrical field and we exchange live well water after each subsample. We handle fish for just a few seconds to determine the species and to measure total length, if necessary, for minimum and maximum sized fish.

We attempt to minimize our impact on fish through a variety of mechanisms including avoidance of targeted fish through sample timing, consulting with local and state scientists so that we generally know what species and sizes of fish to expect, not using chemicals to sedate fish, minimal holding time in live wells, and minimization of shocking impacts.

Consultation with district and regional biologists helps identify the presence of listed fish prior to any electrofishing, and helps determine a sampling period to minimize the likelihood of encountering spawning adults or smolting juveniles. We cease electrofishing if any listed adults enter the electrical field.

To further minimize potential injury due to electrofishing, we use a low pulse rate (30 pulses/s), a narrow pulse width (< 6 msec), and low peak voltage (500 V). These settings are much less damaging to adult fish, and although not as effective for collecting small fish, they do stimulate benthic species to move up into the water column where they are more easily netted. In addition, we employ large cathodes (20 droppers) along the sides of the raft and 6 anode droppers at the front to reduce the field strength in the vicinity of an individual electrode. This also allows us to use lower voltages. When we see that juveniles are being harmed and no adults are being collected, we increase the pulse rate (which decreases damage to small fish, but increases the threat to larger fish), and shorten the holding time in the live well.

To reduce the risk of disease transfer (e.g., whirling disease), all equipment used while electrofishing is chemically disinfected with an ammonium derivative (Betco®) between basins.

JUSTIFICATION FOR TAKING THREATENED OR ENDANGERED SPECIES: While collecting fish, benthos, and periphyton, listed species may also occasionally be encountered incidentally. For example, in an earlier pilot we discovered a previously unknown population of Oregon chub (Hughes et al., 1998). In 1997, we found two populations of sucker that may represent a distinct but currently unrecognized species. In other words, our survey is not focused on listed species and few of our selected sites are expected to contain them, but occasionally we may take them, and under the terms of the Endangered Species Act we need permission to do so. We have selected a fish sampling method (raft electrofishing) that can be employed safely, economically, and efficiently from a human perspective. It is also the most effective technique for sampling the entire fish assemblage and involves far less handling stress than other nondestructive methods (trap nets, seines). Although snorkeling is suitable for identifying the presence of many

water column species, it is ineffective for detecting benthic species or for distinguishing among species that often require laboratory identification (sculpins, lampreys). In addition, snorkeling in several rivers that we have selected would mean placing the snorkler at great risk to disease or drowning. Some sites are listed as whitewater rivers, where swimming in fast currents with obstacles is dangerous. Some rivers selected support bacteria concentrations that exceeded state standards for swimming, or are too turbid for detecting fish through snorkeling. Finally, using one method in most rivers and a second method in the others prevents us from making statistically valid estimates of riverwide condition in multiple rivers, which is necessary to achieve the objective of our study.

Benefits of this Project to the Wild Populations of Concern:

The objective of our biological sampling is to determine the species present and their proportionate abundances; these data are then used to estimate the biological condition of the rivers. Since the sites were all randomly selected, the data collected over the two years of the project can then be used for making riverwide estimates of condition. Such information is essential for rational management of aquatic resources, whether they be listed species or simply ecosystems of concern. A long-term goal of this research is to aid subsequent assessments of status and trends in the nation's (region's) rivers in a statistically and ecologically rigorous manner as mandated by the Clean Water Act. Ecologically and statistically rigorous monitoring should lead to rigorous enforcement of that Act. This in turn will reduce the need for listing those aquatic species that are limited by physical and chemical habitat, and increase the recovery potential of those that are listed.

H. Description and Estimates of Take

1. List of each species and/or population and/or ESU to be taken: Our survey is not focused on listed species, but occasionally we may take them and under the terms of the Endangered Species Act we need permission to do so. The list of threatened and/or endangered anadromous species (ESUs) that may be taken during sampling activities in 2006 and 2007 includes the following:

UCR Spring Chinook Salmon (*Oncorhynchus tshawytscha*)
UCR Steelhead (*Oncorhynchus mykiss*)
UWR Chinook Salmon (*Oncorhynchus tshawytscha*)
UWR Steelhead (*Oncorhynchus mykiss*)
MCR Steelhead (*Oncorhynchus mykiss*)
OC Coho Salmon (*Oncorhynchus kisutch*)

All other anadromous listed species have ESU boundary ranges not overlapping with our target sites. Other listed resident species with overlapping ranges will be covered under a USFWS permit.

2. Sampling schedule and locations: Our surveys of these waters will occur between 19 June and 1 September based on district biologist recommendations to minimize and avoid potential impacts to listed species. The list of candidate rivers for 2006 and 2007 will be sampled via raft electrofishing by Oregon State University (Table 1).

Table 1. Sampling locations within ESU boundaries in Washington, Oregon and Idaho for 2004.

State	River Name	County	Gazeteer Pages	Upper	Lower
WA	Okanogan	Okanogan	100, 101, 115	Oroville	Monse
	Soleduck	Clallam	75	Soleduck Hot Springs	Quillayute Rv.
	Chehalis	Grays Harbor, Lewis	44, 45	Pe Ell	S. Montesano
OR	*Mary's	Benton	53	Avery Park	Willamette Rv.
	*Long Tom	Benton	47	Monroe	Willamette Rv
	*Calapooia	Linn	53	OR-99	Albany
	*M. F. Willamette	Lane	42, 43	Oakridge	Black Canyon
	Willamette	Lane- Multnomah	47, 53, 59, 60, 66	Eugene	Columbia Rv
	Umpqua	Douglas	35, 40	Roseburg	Scottsburg
	Malheur	Malheur	78, 79	Beulah Reservoir	Vale
	John Day	Wheeler, Gilliam	81, 80, 84	Kimberly	Cottonwood
ID	Main & S. F. Payette	Boise, Gem	35	Lowman	Montour
	Kootenai	Boundary	48, 63	MT State Line	Porthill
	St. Joe	Shoshone, Benewah	59, 61	Club Point	St. Maries

*These training sites will be sampled in June 2006 and 2007.

3 and 4. Description of recent status and trends relative to the locations of taking for each species/population/ESU to be taken:

Given the nature of our sampling, the age, size, sex, and origin (hatchery/wild) of the fish that might be incidentally taken are unknown. Given the anticipated sampling periods, it is highly unlikely that adult coho, chinook, or steelhead will be collected. Based on conversations with local fish biologists which are encapsulated below, we have attempted to identify a sampling period to either miss or minimally encounter listed salmonids.

WASHINGTON

Upper Columbia River Spring Chinook Salmon (*Oncorhynchus tshawytscha*) ESU.

* Okanogan River - John Arterburn (Colville Tribe anadromous fish biologist) feels we are unlikely to encounter chinook in the main stem because of warm summer temperatures, but anything is possible. We may incidentally take (catch and release) 5 chinook juveniles, and incidentally take (observe/harass) 2 chinook adults per site.

Upper Columbia River steelhead (*Oncorhynchus mykiss*) ESU.

* Okanogan River - John Arterburn (Colville Tribe anadromous fish biologist) feels we are unlikely to encounter steelhead in the main stem because of warm summer temperatures, but anything is possible. We may incidentally take (catch and release) 5 steelhead juveniles, and incidentally take (observe/harass) 2 steelhead adults per site.

OREGON

Mid-Columbia steelhead (*Oncorhynchus mykiss*) ESU.

*John Day (Kimberly to Cottonwood): Tim Unterwegner (Oregon DFW district biologist) indicated that by sampling June through July we would avoid steelhead and still have enough water to float the river. We may incidentally take 5 juveniles (catch and release) and 2 adults (observe/harass) per site.

Upper Willamette River chinook salmon (*Oncorhynchus tshawytscha*) wild & hatchery ESU.

Basins:

Jeff Ziller, Kelly Reis, and Steve Mamoyac (Oregon DFW district biologists) feel that by sampling the main stem Willamette between 15 July and 30 August we will minimize impact to listed salmon. The training rivers (lower Marys, Long Tom, Calapooia, M.F. Willamette, and Willamette at Corvallis) usually lack salmon by late June.

* Marys River (River km 0-7): We may incidentally take 5 chinook juveniles (catch and release) and 2 adults (observe/harass).

* Long Tom River (River km 1-7): We may incidentally take 5 chinook juveniles (catch and release) and 2 adults (observe/harass).

* Willamette River (Eugene to Columbia): We may incidentally take 5 chinook juveniles (catch and release) and 2 adults per site (observe/harass).

* Middle Fork Willamette River (River km 354-367): We may incidentally take 5 chinook juveniles (catch and release) and 2 adults (observe/harass).

* Calapooia River (River km 15-30): We may incidentally take 5 chinook juveniles (catch and release) and 2 adults (observe/harass).

Upper Willamette River steelhead (*Oncorhynchus mykiss*) ESU. Basins:

Jeff Ziller, Kelly Reis, and Steve Mamoyac (Oregon DFW district biologists) feel that by sampling the main stem Willamette between 15 July and 30 August we will minimize impact to listed steelhead.. The training rivers (lower Marys, Long Tom, Calapooia, M.F. Willamette, and Willamette at Corvallis) usually lack steelhead by late June.

* Willamette River (Eugene to Columbia): We may incidentally take 5 juveniles (catch and release) and 2 adults (observe/harass) per site.

* Calapooia River (River km 15-30): We may incidentally take 5 juveniles (catch and release) and 2 adults (observe/harass).

Oregon Coast coho salmon (*Oncorhynchus kisutch*) ESU.

* Umpqua River: Sam Moyers (ODFW district biologist) suggests sampling June to September will avoid most salmon because the lower river is warm, but to be alert near tributaries. We may take (catch and release) 10 coho juveniles and possibly 2 coho adults (observe, harass) per site.

5. Estimates of potential annual mortalities by take category, including a justification: Refer to Table 3, 4 and 5 for take accounts of ESA listed fish in Washington and Oregon collected during EMAP sampling activities from 2000-03 (originally submitted as part of the annual report requirements). The indirect mortalities listed in Table 3-5 were a result of sampling activities (e.g., electrofishing, handling, generalized stress).

6. Provide details on how all take estimates, including mortalities, were derived: All take estimates are from direct measurements.

I. Transportation and Holding

No live fishes will be transported. It is probable that some live invertebrates will be transported incidentally on the rafts or vehicles, but these will be treated between basins.

J. Cooperative Breeding Program

We lack the facilities and interest to cooperate in a breeding program. We doubt that our data would contribute to a breeding program, but we can willingly provide it if it does.

K. Previous or Concurrent Activities Involving Listed Species

1. Identify all previous permits working with federally-listed species:

Federal permits held currently:

USFWS - Region 1: Recovery Permit No. TE-025733-2 for threatened bull trout (*Salvelinus confluentus*), threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), and non-listed coastal cutthroat trout (*Oncorhynchus clarki clarki*). Permit No. TE-025733-0 was amended in 2001 (Permit No. TE025733-1) to include take of bull trout (*Salvelinus confluentus*) in additional sample sites in Oregon, Washington, and Idaho. Permit No. TE-025733-1 was amended in 2002 (Permit No. TE025733-2) to include Oregon chub (*Oregonichthys crameri*) and White River spinedace (*Lepidomeda albivallis*). Expired 7/10/05.

USFWS - Region 2: Endangered Species Permit No. TE026690-0 for Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*). Expires 3/14/06.

NMFS - NW Region permit for Scientific Purposes under Section 10 of the Endangered Species Act. Permit 1156. Species included: Upper Columbia spring chinook salmon (*Oncorhynchus tshawytscha*), Upper Columbia River steelhead (*Oncorhynchus mykiss*), Lower Columbia River chinook salmon (*O. tshawytscha*), Snake River steelhead (*O. mykiss*), Middle Columbia River steelhead (*O. mykiss*), Lower Columbia River steelhead (*O. mykiss*), Puget Sound chinook salmon (*O. tshawytscha*), Upper Willamette River steelhead (*O. mykiss*), Upper Willamette River

chinook salmon (*O. tshawytscha*), Snake River spring/summer chinook salmon (*O. tshawytscha*), Snake River fall chinook salmon (*O. tshawytscha*), Oregon Coast coho salmon (*Oncorhynchus kisutch*), and Southern Oregon/Northern California Coasts coho salmon (*O. kisutch*). Expires 12/31/06.

NMFS - SW Region permit (California) for Scientific Purposes under Section 10 of the Endangered Species Act. Permit number 1288. Species included: Southern Oregon/Northern California Coasts coho salmon (*Oncorhynchus kisutch*), Central California Coast coho salmon (*O. kisutch*), Northern California steelhead (*Oncorhynchus mykiss*), Central California Coast steelhead (*O. mykiss*), and California Coastal chinook salmon (*O. tshawytscha*). Expires 6/30/08.

Additional federal permits required:

USFWS - Region 6: Endangered/Threatened Species Permit No. TE-045235-1 for Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail chub (*Gila elegans*). Expired 12/31/03.

State permits held currently:

None.

Additional State permits required that have been applied for, or are in the process of application:

State of Oregon
State of Washington
State of Idaho

List of previously held permits (federal, state, tribal):

USFWS - Region 6: Endangered/Threatened Species Permit No. PRT-704930 (SP00-23-00) for Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail chub (*Gila elegans*). Expired 3/31/01.

USFWS - Region 1: Subpermit No. USEPA. Subpermit to Take the Oregon Chub (*Oregonichthys crameri*), Lost River Sucker (*Deltistes luxatus*), Shortnose Sucker (*Chasmistes brevirostris*), Warner Sucker (*Catostomus warnerensis*), and Lahontan Cutthroat Trout (*Salmo clarki henshawi*). Expired 9/30/98.

Consultation on Environmental Monitoring and Assessment Program in Rogue, Winchuk, Umpqua, Grande Ronde, and Imnaha Basin Streams, U.S. Environmental Protection Agency (9 July 1997).

State of Oregon Scientific Taking Permit Nos. 00-112, 00-143, 00-150, 00-118, 02-439M2, OR2003-709

State of Washington Scientific Collection Permit No. 00-272a, 02-157a, 03-189a

State of Idaho Scientific Collectors Permit No. F-26-84.

State of Montana Scientific Collectors Permit No. SCP-17-00.
 State of Utah Certificate of Registration No. 1COLL4742.
 State of North Dakota Scientific Collection Permit No.s 000102044788 and 000102044789.
 State of South Dakota Scientific Collection Permit (License) No's. 52, 38, 13.
 State of Arizona Scientific Collecting Permit No's. 551518, 622977, 699001, 747696
 State of Nevada Scientific Collection Permit No.S 20051, S 22149
 State of California Collection Permit No. 006040
 State of Colorado Scientific Collection License No. 01-AQ905.
 State of Wyoming Chapter 33 Permit No. 510
 Olympic National Park (WA) - Permit number OLYM-2003-SCI-0006
 Redwood National Park (CA) - Permit number REDW-2003-SCI-0016
 California State Parks permit number 03-635-008.
 Navajo Nation Fish and Wildlife Permit No. 000804-086.
 Flathead Reservation (MT) - No permit number was given.
 Warm Springs (OR) - No permit number given.
 Nez Perce (ID) - No permit number given.
 San Carlos Apache (AZ) - No permit number given.

2. For the above federal permits, list all mortality events of listed species which have occurred in the last five years:

1997 (Oregon):

Snake River chinook salmon ESU - *Oncorhynchus tshawytscha* (Wallowa River, Grande Ronde Basin) one mortality as a result of electrofishing and temperature.

No additional mortalities were recorded in 1997 for ESU's delineated at that time. There were, however, additional mortalities for non-listed salmonids: *Oncorhynchus mykiss* 19 mortalities as a result of electrofishing and temperature; *Oncorhynchus tshawytscha* 14 mortalities as a result of electrofishing and temperature. There were no coho salmon (*Oncorhynchus kisutch*) mortalities.

We list 34 salmonid mortalities in 1997; this compares to 703 salmonids collected in the 21 rivers, for a salmonid mortality rate of 4.8% (which is comparable to the overall fish mortality rate of 4.7%).

1998 (Oregon):

No listed species were taken in 1998, thus no mortalities for ESU's delineated at that time. There were, however, additional mortalities for non-listed salmonids: *Oncorhynchus clarki* 8 mortalities (5.8% of the catch in 1998); *Oncorhynchus mykiss* 40 mortalities (7.6% of the catch) in 1998; and *Oncorhynchus tshawytscha* 17 mortalities (16.6% of the catch) in 1998. There were no coho salmon (*Oncorhynchus kisutch*) mortalities.

For 1998, the overall fish mortality rate was 8.6%. Salmonid mortality rate was 9.8% for the 29 rivers sampled; it was highest in the first salmonid river sampled while the crew was still learning how to adjust the pulsator.

1999: No sampling

2000 (WA, OR, ID, MT, UT, ND, SD, CA, WY):

Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*) ESU: 2 smolts and 1 juvenile were incidentally killed on the Nooksak River, Washington. Causes: possibly direct contact with electrofisher anode, and/or combined effects of the exhaustion resulting from electrofishing and handling coupled with the physiological stresses of smoltification.

Upper Willamette River Chinook Salmon (*Oncorhynchus tshawytscha*) ESU: 5 smolts were incidentally killed on the Willamette River, Oregon. Causes: possibly direct contact with electrofisher anode, and/or combined effects of the exhaustion resulting from electrofishing and handling coupled with the physiological stresses of smoltification.

We encountered several other federally-listed species with no mortalities:

Bull trout (*Salvelinus confluentus*) in Idaho and Washington,

Non-listed coastal cutthroat trout (*Oncorhynchus clarki clarki*) in Washington,

Colorado pikeminnow (*Ptychocheilus lucius*) in Utah

Humpback chub (*Gila cypha*) in Utah.

2001 (WA, OR, ID, MT, UT, ND, SD, CA, WY):

Upper Columbia Spring-Run Chinook Salmon (*Oncorhynchus tshawytscha*) ESU: 39 smolts were captured and handled on the Wenatchee R., Washington - 35 were released alive and unharmed, 4 were incidentally killed.

Upper Willamette River Chinook Salmon (*Oncorhynchus tshawytscha*) ESU: On the Willamette, M. Fk. Willamette, and Calapooia Rivers a total of 1 adult was observed (not captured or handled) and released alive and unharmed; 21 smolts were captured and handled - 17 were released alive and unharmed, 4 were incidentally killed (1 vouchered, 3 returned to river); and 45 smolt/immatures were captured and handled - 33 were released alive and unharmed, 12 were incidentally killed and returned to the river.

We encountered two other federally-listed species with no mortalities:

Oregon chub (*Oregonichthys crameri*) in Oregon

Colorado pikeminnow (*Ptychocheilus lucius*) in Arizona and Utah

2002 (WA, OR, ID, MT, UT, ND, SD, CA, WY):

Upper Willamette River Chinook Salmon (*Oncorhynchus tshawytscha*) ESU: A total of 41 Upper Willamette River chinook salmon were taken from two sites in the Willamette River in June, 2002 (Table 3). These fish were all captured via a raft electrofisher and either measured and released, or retained as voucher specimens only in the event of incidental mortality. We captured and handled 5 chinook juveniles while training field crews on the Willamette R., There was one incidental mortality which was returned to the water and was not retained as a voucher specimen; the remaining four fish were released unharmed. We captured an additional 36 juvenile chinook at a second location on the Willamette River in late June. Of these 36 fish, there was one incidental mortality which was retained as a voucher specimen and the remaining 35 fish were released unharmed. We also observed 10 adult chinook at this second location; these fish were observed via raft electrofishing but were not captured or handled.

We encountered several other federally-listed species with no mortalities:

Upper Columbia River Spring-Run Chinook Salmon (*Oncorhynchus tshawytscha*) in Washington
Lower Columbia River Chinook Salmon (*Oncorhynchus tshawytscha*) in Oregon
Lower Columbia River Steelhead (*Oncorhynchus mykiss*) in Oregon
Southern Oregon/Northern California Coasts Coho (*Oncorhynchus kisutch*) in Oregon
Colorado pikeminnow (*Ptychocheilus lucius*) in Utah
Bonytail chub (*Gila elegans*) in Utah
Humpback chub (*Gila cypha*) in Utah
Bull trout (*Salvelinus confluentus*) in Montana

2003 (WA, OR, ID, AZ, CO, MT, UT, ND, SD, CA, WY):

No listed fish were incidentally killed as a result of electrofishing. We encountered the following federally-listed species with no mortalities:

Upper Columbia River Spring-Run Chinook Salmon (*Oncorhynchus tshawytscha*) in Washington
Bull trout (*Salvelinus confluentus*) in Washington
Upper Willamette River Chinook Salmon (*Oncorhynchus tshawytscha*) in Oregon
Lost River sucker (*Deltistes luxatus*) in Oregon
Razorback sucker (*Xyrauchen texanus*) in Arizona

Measures taken to diminish or eliminate such mortalities, and the effectiveness of those measures:

To minimize electrofishing injury, we use a low pulse rate (30 pulses/s), a narrow pulse width (< 6 msec), low peak voltage (500 V), and a soft mesh dip net. These settings are much less damaging to large fish. When we kill a juvenile salmonid and no adults are being observed, we increase the pulse rate (which decreases damage to small fish, but increases the threat to larger fish). If large and small salmonids are present and the small ones are being killed, we shorten the holding time in the live well. We have also increased the length of the training period to reduce mortalities at the first site sampled. (See section G for more detailed information.)

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XII & XIII. Certification:

I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) and regulations promulgated thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the Endangered Species Act of 1973.

Name: Robert M. Hughes

Title: Research Associate Professor

Signature: _____

Date: _____

Table 2. Authorized Take amount of ESA-listed fish in Oregon, Washington and Idaho, for 2003, permit #1156, modification 2.

ESU	LIFE STAGE	ORIGIN	TYPE OF TAKE	Take requested by activity	Unintentional Mortality
UCR Spring Chinook	Juvenile	Naturally-Produced	Capture, Handle, Release	35	1/35
UCR Spring Chinook	Juvenile	Artificially-Propagated	Capture, Handle, Release	35	1/35
UCR Spring Chinook	Adult	Naturally-Produced and Artificially-Propagated	Capture, Handle, Release	8	0
UCR Steelhead	Juvenile	Naturally-Produced	Capture, Handle, Release	42	1/42
UCR Steelhead	Juvenile	Artificially-Propagated	Capture, Handle, Release	42	1/42
UCR Steelhead	Adult	Naturally-Produced and Artificially-Propagated	Capture, Handle, Release	10	0
LCR Chinook	Juvenile	Naturally-Produced	Capture, Handle, Release	20	0
LCR Chinook	Adult	Naturally-Produced	Capture, Handle, Release	6	0
SNR Steelhead	Juvenile	Naturally-Produced	Capture, Handle, Release	15	1/15
SNR Steelhead	Adult	Naturally-Produced	Capture, Handle, Release	6	0
MCR Steelhead	Juvenile	Naturally-Produced	Capture, Handle, Release	35	1/35
MCR Steelhead	Adult	Naturally-Produced	Capture, Handle, Release	12	0
LCR Steelhead	Juvenile	Naturally-Produced	Capture, Handle, Release	26	1/26
LCR Steelhead	Adult	Naturally-Produced	Capture, Handle, Release	10	0
PS Chinook	Juvenile	Naturally-Produced	Capture, Handle, Release	5	0
PS Chinook	Juvenile	Artificially-Propagated	Capture, Handle, Release	5	0
UWR Chinook	Juvenile	Naturally-Produced	Capture, Handle, Release	102	2/102
UWR Chinook	Adult	Naturally-Produced	Capture, Handle, Release	42	0
UWR Steelhead	Juvenile	Naturally-Produced	Capture, Handle, Release	51	1/51

ESU	LIFE STAGE	ORIGIN	TYPE OF TAKE	Take requested by activity	Unintentional Mortality
UWR Steelhead	Adult	Naturally-Produced	Capture, Handle, Release	20	0
SNR S/S Chinook	Juvenile	Naturally-Produced and Artificially-Propagated	Capture, Handle, Release	10	1/10
SNR S/S Chinook	Adult	Naturally-Produced and Artificially-Propagated	Capture, Handle, Release	2	0
SNR Fall Chinook	Juvenile	Naturally-Produced	Capture, Handle, Release	5	0
SNR Fall Chinook	Adult	Naturally-Produced	Capture, Handle, Release	2	0
OC Coho	Juvenile	Naturally-Produced	Capture, Handle, Release	6	1/6
OC Coho	Adult	Naturally-Produced	Capture, Handle, Release	2	0
SONCC Coho	Juvenile	Naturally-Produced	Capture, Handle, Release	11	1/11
SONCC Coho	Adult	Naturally-Produced	Capture, Handle, Release	2	0

Table 3. Take account of ESA-listed fish in Washington and Oregon, 2000.

Number of Individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category	Location	Dates	Details
3	Puget Sound Chinook Salmon	smolt	NA	NA	capture, handle, and release	Nooksak R., Washington	9/6/2000	
1	Puget Sound Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	Nooksak R., Washington	9/6/2000	Released
1	Puget Sound Chinook Salmon	immature	NA	NA	incidental take, incidental mortality	Nooksak R., Washington	9/6/2000	Jack, released
1	Puget Sound Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	Nooksak R., Washington	9/6/2000	Vouchered
20	Puget Sound Chinook Salmon	immature	NA	NA	observe/harass	Nooksak R., Washington	9/6/2000	Jacks, not captured
2	Puget Sound Chinook Salmon	adult	NA	NA	observe/harass	Nooksak R., Washington	9/6/2000	Not captured
7	Upper Willamette River Chinook Salmon	smolt	NA	NA	capture, handle, and release	Willamette R., Oregon	9/27/2000, 9/28/2000	
5	Upper Willamette River Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	Willamette R., Oregon	9/27/2000, 9/28/2000	5 vouchered (1 was a mortality)
1	Upper Willamette River Chinook Salmon	adult	NA	NA	observe/harass	Willamette R., Oregon	9/27/2000, 9/28/2000	Not captured

Table 4. Take account of ESA-listed fish in Washington and Oregon, 2001.

Number of Individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category	Location	Dates	Details
35	Upper Columbia River Spring Chinook Salmon	smolt	NA	NA	capture, handle, and release	Wenatchee R., Washington	9/10/2000	
3	Upper Columbia River Spring Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	Wenatchee R., Washington	9/10/2000	Released to river.
1	Upper Columbia River Spring Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	Wenatchee R., Washington	9/10/2000	Vouchered
1	Upper Columbia River Steelhead	adult	NA	NA	capture, handle, and release	Wenatchee R., Washington	9/10/2000	
33	Upper Willamette River Chinook Salmon	smolt and immature	NA	NA	capture, handle, and release	Willamette R., Oregon	5/24/2001	
12	Upper Willamette River Chinook Salmon	smolt and immature	NA	NA	incidental take, incidental mortality	Willamette R., Oregon	5/24/2001	Released to river.
1	Upper Willamette River Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	Willamette R., Oregon	5/24/2001	Vouchered
1	Upper Willamette River Chinook Salmon	adult	NA	NA	capture, handle, and release	Willamette R., Oregon	5/24/2001	handled briefly, then released.
4	Upper Willamette River Chinook Salmon	smolt	NA	NA	capture, handle, and release	Calapooia R., Oregon	5/31/2001	
13	Upper Willamette River Chinook Salmon	smolt	NA	NA	capture, handle, and release	M. Fk. Willamette R, Oregon	5/29/2001	
3	Upper Willamette River Chinook Salmon	smolt	NA	NA	incidental take, incidental mortality	M. Fk. Willamette R, Oregon	5/29/2001	Released to river.

Table 5. Take account of ESA-listed fish in Oregon and Washington, 2002.

Number of Individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category	Location	Dates	Details
1	Upper Columbia River Spring Chinook Salmon	juvenile	NA	NA	capture, handle, and release	Wenatchee R., Washington	7/11/02	
9	Upper Columbia River Spring Chinook Salmon	1 jack 8 juveniles	NA	NA	observe/harass	Wenatchee R., Washington	7/11/02	Seen from raft. Not captured or handled
4	Upper Willamette River Chinook Salmon	juvenile	NA	NA	capture, handle, and release	Willamette R., Oregon	6/15/02	
1	Upper Willamette River Chinook Salmon	juvenile	NA	NA	incidental take, incidental mortality	Willamette R., Oregon	6/15/02	Released to river.
35	Upper Willamette River Chinook Salmon	juvenile	NA	NA	capture, handle, and release	Willamette R., Oregon	6/25/02	
1	Upper Willamette River Chinook Salmon	juvenile	NA	NA	incidental take, incidental mortality	Willamette R., Oregon	6/25/02	Vouchered
10	Upper Willamette River Chinook Salmon	adult	NA	NA	observe/harass	Willamette R., Oregon	6/25/02	Seen from raft. Not captured or handled
2	Lower Columbia River Chinook Salmon	adult	NA	NA	observe/harass	Sandy R., Oregon	7/25/02	Seen from raft. Not captured or handled
20	Lower Columbia River Chinook Salmon	juvenile	NA	NA	observe/harass	Sandy R., Oregon	7/25/02	Seen from raft. Not captured or handled
1	Lower Columbia River Steelhead	adult	NA	NA	observe/harass	Sandy R., Oregon	7/25/02	Seen from raft. Not captured or handled

Number of Individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category	Location	Dates	Details
1	Southern Oregon / Northern California Coastal Coho Salmon	juvenile	NA	NA	capture, handle, and release	Rogue R., Oregon	8/01/02	

Table 6. Take account of ESA-listed fish in Oregon and Washington, 2003.

ESU/Species	Life Stage	Take Activity	Number of Fish Authorized for Take	Actual Number Taken	Authorized Unintentional Mortality	Actual Unintentional Mortality	Location	Dates
Upper Columbia River Spring Chinook Salmon	juveniles	capture, handle, and release	35	~3	1/35	0	Wenatchee R., Washington	7/10/03
Upper Columbia River Spring Chinook Salmon	adults	capture, handle, and release	8	~8	0	0	Wenatchee R., Washington	7/10/03
Upper Willamette River Chinook Salmon	juvenile	capture, handle, and release	102	2	2/102	0	Pudding R., Oregon	5/30/03
Upper Willamette River Chinook Salmon	juvenile	capture, handle, and release	102	1	2/102	0	Marys R., Oregon	4/02/03